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Sheet	2	of	5
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Complete if Known

Application Number	10/678,438
Filing Date	3 October 2003
First Named Inventor	Vladimir V. MAKAROV
Art Unit	
Examiner Name	
Attorney Docket Number	65.0395

U. S. PATENT DOCUMENTS

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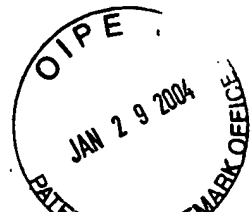
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**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**

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Sheet 1

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Examiner Initials*	Cite No. ¹	Document Number	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number-Kind Code ² (if known)			
		US- 5,840,630	11-24-1998	Cecere et al.	
		US- 6,514,866 B2	02-04-2003	Russell et al.	
		US- 2003/0060048 A1	03-27-2003	Russell et al.	
		US- 2003/0038113 A1	02-27-2003	Makarov et al.	
		US- 6,407,001 B1	06-18-2002	Scott	
		US- 6,509,276 B2	01-21-2003	Scott	
		US- 5,798,529	08-25-1998	Wagner	
		US- 5,958,799	09-28-1999	Russell et al.	
		US- 2001/0053605 A1	12-20-2001	Phaneuf et al.	
		US- 2002/0195422 A1	12-26-2002	Sievers et al.	
		US- 5,747,818	05-05-1998	Cecere	
		US- 5,336,363	08-09-1994	Morita	
		US- 5,140,164	08-18-92	Talbot et al.	
		US- 5,616,921	04-01-97	Talbot et al.	
		US- 5,700,526	12-23-1997	Ximen et al.	
		US- 5,766,379	06-16-1998	Lanford et al.	
		US- 5,851,413	12-22-1998	Casella et al.	
		US- 5,899,740	05-04-1999	Kwon	
		US- 5,959,358	09-28-1999	Lanford et al.	

FOREIGN PATENT DOCUMENTS

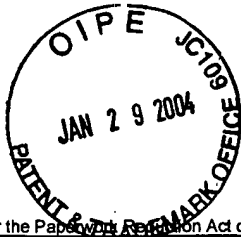
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		JP2295117	12-06-1990	NTT ✓		✓
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)		Complete if Known	
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		First Named Inventor	Vladimir V. MAKAROV
		Art Unit	
Examiner Name			
Attorney Docket Number	65.0395		
Sheet	3	of	5

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ²
		S. Herschbein et al., The Challenges of FIB Chip Repair & Debug Assistance in the 0.25 um Copper Interconnect Millenium, Proceedings from 24th International Symposium for Testing and Failure Analysis, 15-19 November 1998, Dallas, Texas, pp.127-130	
		J. Phillips et al., Channeling effects during focused-ion-beam micromachining of copper, J. Vac. Sci. Technol. A 18(4), Jul/Aug 2000, pp.1061-1065	
		H. Ximen et al., Halogen-Based Selective FIB Milling for IC Probe-Point Creation and Repair, Proceedings from 20th International Symposium for Testing and Failure Analysis, 1994, pp. 141-145.	
		H. Bender et al., Investigation on the Corrosion of Cu Metallization in the Focused Ion Beam System due to a low I2 Background, Proceedings from the 25th International Symposium for Testing and Failure Analysis, 1999, pp. 135-140.	
		V. Makarov et al, Practical FIB Chemistry for Etching Copper, Proceedings of 3RD AVS International Conference on Microelectronics and Interfaces, February 11-14, 2002, Santa Clara, California, USA, pp.115-117	
		V. Makarov et al., Dry Etching Considerations for Copper Metallizations, Proceedings of the 4th AVS International Conference on Microelectronics and Interfaces, March 3-6, 2003 Santa Clara, California, USA, pp 198-200	
		H. Bender et al., Focused Ion Beam Analysis of Organic Low-k Dielectrics, Proceedings from the 26th International Symposium for Testing and Failure Analysis, 12-16 November 2000, Bellevue, Washington, USA, pp. 397-405	
		T. Stark et al., H2O enhanced focused ion beam micromachining, J. Vac. Sci. Technol. B 13(6), Nov/Dec 1995, pp. 2656-2569	
		P. Ho et al., Overview on Low Dielectric Constant Materials for IC Applications, in Low Dielectric Constant Materials for IC Applications, Ed. by P. Ho et al., Springer-Verlag, Berlin, Heidelberg 2003, Chapter I, pp. 1-21	
		J. Gonzalez et al., Chemically enhanced focused ion beam micromachining of copper, J. Vac. Sci. Technol. B 19(6), Nov/Dec 2001, pp. 2539-2542	

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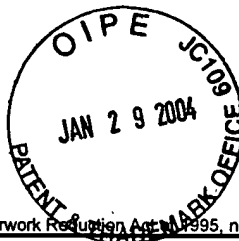
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of

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		J. Gonzalez et al, Improvements in Focused Ion Beam Micro-machining of Interconnect Materials, J. Vac. Sci. Technol. B20(6), Nov/Dec 2002, pp. 2700-2704	
		L. Harriott, Digital scan model for focused ion beam induced gas etching, J. Vac. Sci. Technol. B 11(6), Nov/Dec 1993, pp. 2012-2015	
		R. Lee et al., Low Resistivity FIB Depositions Within High Aspect Ratio Holes, Proceedings of the 22nd International Symposium for Testing and Failure Analysis, 8-22 November 1996, Los Angeles, California, pp. 85-88	
		K. Edinger, Study of precursor gases for focused ion beam insulator deposition, J. Vac. Sci. Tehnol. B 16(6), Nov/Dec 1998, pp. 3311-3314	
		K. Edinger, Gas assisted etching of copper with focused ion beams, J. Vac. Sci. Technol. B 17(6), Nov/Dec 1999, pp. 3058-3062	
		V. Makarov et al., Copper Etch Milling Technique for Device Edits with the IDS P3X and IDS P3Xa, Application Note # rev.1.5, June 19, 2001, pp. 1-5	
		IDS P3X brochure, Schlumberger, printed 10/99, two pages	
		Y. Igarashi et al., Dry Etching Technique for Subquarter-Micron Copper Interconnects, J. Electronchem. Soc., Vol. 142, No. 3, March 1995, pp. L36-L37	
		S. Pauthner, Device modification and gass assisted etching on Cu-samples, 3rd European FIB Users Group Meeting (EFUG99) Abstracts 4 October 1999 (1 paragraph abstract of 8-page document)	
		2-Nitroethanol Material Safety Data Sheet, Aldrich Chemical Co., Inc., valid 02/2003-04/2003, (four pages)	

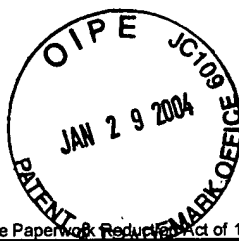
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		N. Goldblatt et al., Unique and Practical IC Timing Analysis Tool Utilizing Intrinsic Photon Emission, Microelectronics Reliability Conference, 2001, 41(9-10): 1507-1512	
		D. Knebel et al., Diagnosis and Characterization of Timing-Related Defects by Time-Dependent Light Emission, IEEE International Test Conference, 1998, pp. 733-739	
		T. Lundquist et al., Ultra-Thinning of C4 Integrated Circuits for Backside Analysis during First Silicon Debug, Microelectronics Reliability Conference, 2001, 41(9-10): 1545-1549	
		T. Lundquist et al., Characterize Gate-Level Transistor Performance with PICA, Semiconductor International, 2001, 4 pages	
		C. Musil et al., Focused Ion Beam Microsurgery for Electronics, IEEE Electron Device Letters, 1986, EDL-7(5):285-287	

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